COURSE CODE	COURSE TITLE	L	T	P	C
1151AE102	ENGINEERING MECHANICS	2	2	0	3

Course Category:

Programme core

a. Preamble :

This course provides an introduction to the basic concepts of forces, inertias, centroids, and moments of area and techniques of finding their effects on motion. It introduces the phenomenon of friction and its effects. It introduces students to cognitive learning in applied mechanics and develops problem-solving skills in both theoretical and engineering oriented problems.

b. Prerequisite Courses:

- Introduction to Engineering
- Engineering Mathematics I

c. Related Courses:

- Spaceflight Mechanics

d. Course Educational Objectives :

- To inculcate the basic knowledge in mechanics in the areas of applied engineering.
- To develop the skills in the areas of forces and their effects and in the concept of free body diagram

e. Course Outcomes :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Solve engineering problems using the principles of statics of particles	K2
CO2	Establish the magnitude of forces and moments acting on rigid bodies	K2
CO3	Define properties and theories related to surfaces and solids	K3
CO4	Solve engineering problems using the principles of dynamics of particles	K3
CO5	Describe the principles of various types of friction	K2

f.Correlation of COs with POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**H**			**H**			**M**	**H**	**L**			
CO2	**H**			**H**			**M**	**H**	**L**			
CO3	**H**			**H**			**M**	**H**	**L**			
CO4	**H**			**H**			**M**	**H**	**L**			
CO5	**H**			**H**			**M**	**H**	**L**			

H- High; M-Medium; L-Low

Course Contents:

UNIT I BASICS & STATICS OF PARTICLES L-6 T-6

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and Triangular Law of forces – Vectors – Vectorial representation of forces and couples – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES L-6 T-6

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis –Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III PROPERTIES OF SURFACES AND SOLIDS L-6 T-6

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Second and product moments of plane area – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia

UNIT IV DYNAMICS OF PARTICLES L-6 T-6

Displacement, Velocity and Acceleration, their relationship – Relative motion – Curvilinear motion – Newton's laws – Work-Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V FRICTION L-6 T-6

Frictional force – Laws of Coloumb friction – simple contact friction – Belt friction – Roller friction. Translation and Rotation of Rigid Bodies – General Plane motion.

Total Periods: 30 + 30 = 60

f. Learning Resources

i. Text Books:

1. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2015.
2. S. Timoshenko, D.H. Young, J.V. Rao, SukumarPati, Engineering Mechanics, McGraw Hill Education (India) Private Limited., 2013

ii. References:

1. Palanichamy, M. S., and Nagan, S., Engineering Mechanics (Statics and Dynamics), Tata McGraw Hill, New Delhi 2012.
2. Kumar, K. L., Engineering Mechanics, Tata McGraw- Hill, New Delhi, 2011.
3. Shames, I. H., and Krishna Mohana Rao, G., Engineering Mechanics (Statics and Dynamics), Dorling Kindersley India) Pvt. Ltd. (Pearson Education), 2011.
4. Beer, F. P., and Johnston, E. R., Vector Mechanics for Engineers – Dynamics and Statics, Tata McGraw-Hill, New Delhi, 2011.
5. Natarajan, K.V., Engineering Mechanics, Dhanalakshmi Publishers, 2011.
6. Rajasekaran, S. and Sankarasubramanian, G., Engineering Mechanics, Vikas Publishing House Pvt Ltd, 2011.